Research Perspectives at Jefferson Lab: 12 GeV and beyond[1]

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The plans for upgrading the CEBAF accelerator at Jefferson Lab to 12 GeV are presented. The research program supporting that upgrade is illustrated with a few selected examples. The instrumentation under design to carry out that research program is discussed. The research program with the 12 GeV upgrade will provide breakthroughs in two key areas: (1) the experimental confirmation of the origin of quark confinement by QCD flux tubes and (2) the determination of the quark and gluon wave functions. In addition, the upgrade will provide important advances in areas already under study.

Electron-ion colliders with a center of mass energy between 15 and 100 GeV, a luminosity of at least 10^{33} cm^{-2} sec^{-1}, and a polarization at or above 80% have been proposed for future studies of hadronic structure. In this report several options for such a facility at Jlab will be presented and discussed, together with parameters which would provide a luminosity up to $6x10^{34}$ cm^{-2} sec^{-1} . The feasibility of combining such a collider at a center-of-mass energy of 30-45 GeV with a fixed target facility is also being explored.

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